# Nickel of Plating Solution

**Chelatometric titration by**

**Automatic Potentiometric Titrator**

## 1. Abstract

Quantification of Nickel in plating solution is performed by chelatometric titration with 0.1mol/L EDTA after adding pure water and buffer to the sample. The inflexion point by color change of indicator on titration curve is defined as the endpoint. The concentration of Nickel is calculated from titration volume of EDTA.

## 2. Reference

2) “Chelatometry” by Kagehira Ueno from Nankodo Publisher

## 3. Cautions in measurement

1) Handle with care when you work on chemicals. Work in a well ventilated room or use a draft.
2) Optimize pH since reactivity of sample and titrant changes during chelatometric titration.
4. Post-measurement care

Clean the photo sensor with ethanol and then with pure water.

5. Test equipment

Main unit: Automatic potentiometric titrator (Option: Photometric preamplifier: PTA-)
Electrode: Option: Photo sensor

6. Reagent

Titrant: 0.1mol/L EDTA (f=1.00)
Additive: Pure water, Buffer (Ammonium chloride, Ammonia water)
Indicator: MX

7. Measurement procedure

—Pretreatment—
1) Mix 140g Ammonium chloride and 95mL Ammonia water with 1800mL pure water to make it for buffer.

—Measurement—
1) Deliver 1.0mL sample to a 100mL beaker.
2) Add 50.0mL of pure water.
3) Add 24mL of buffer.
4) Add MX indicator.
5) Titrate with 0.1mol/L EDTA to obtain concentration of Nickel.

8. Formula

Nickel (g/L) = (EP1 - BL1) × FA1 × C1 × K1 / SIZE
EP1: Titration volume (mL)
BL1: Blank level (0.00mL)
FA1: Factor of titrant (1.00)
C1: Concentration conversion coefficient (5.84mg/mL)
K1: Unit conversion coefficient (1)
SIZE: Sample size (mL)
9. Example of measurement

—Ambient condition—

| Room temperature: 25 °C | Humidity: 50 % | Weather: Fair |

-Titration parameter-

| Titration mode | Auto cut-off | Preamplifier unit | %T |
| Titration form | EP Stop | Max. titration volume | 20.0mL |
| Titration burette | 01 | Auto stirrer | Off |
| Reagent name | EDTA | Wait time before titration | 0s |
| Detector number | 3 | Titration direction | Auto |

[Control parameter]

| Number of EPs | 1 | Data sampling potential | 2.0mV |
| Simulation | Off | Data sampling volume | 0.1mL |
| EP sense (Potential) | 30.0 | Separate potential setup | Off |
| EP sense (Differential) | 100.0 | Separate potential | 0.0%T |
| Over-titration | 0.0mL | EP potential setup | Off |
| Gain | 1 | EP potential | 0.0%T |

-Titration curve-

(The above printout data were obtained from titration by AT-410)
Measurement result

<table>
<thead>
<tr>
<th>n</th>
<th>Sample (mL)</th>
<th>Nickel concentration (g/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.0</td>
<td>10.424</td>
</tr>
</tbody>
</table>

*The above test result was obtained by a single test of the same sample.

10. Summary

Plating means metal surface processing by cladding film or its technique. Plating solution is the liquid for plating metallic materials.

Nickel is a metallic material of chemical symbol Ni with atomic number 28, which is highly corrosive resistant and used in plating. It is also used in making stainless steel and coins.

The sample measurement shows a clear color change by indicator on titration curve. Reliable measurement is assured by the automated potentiometry.

Nickel of plating solution can be perfectly analyzed by any of the following titration systems manufactured by Kyoto Electronics (KEM).

【AT-610】
- Awarded Product of Supreme Technology from Kyoto City
- Easy key entry by touch panel of large color LCD (8-inch wide)
- Simultaneous titration in parallel
- Both potentiometric and Karl Fischer moisture titration (coulometric•volumetric) can be performed at a time.

【AT-510】
- Compact and cost performance model
- PC card expands data memory for convenience and versatility.

【AT-500N-1】
- Low cost and high performance
- Easy view with back light LCD
- GLP/GMP conformed model

Awarded Product of Supreme Technology from Kyoto City

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